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MEMORANDUM

TO:	The Honorable Charles L.A. Terreni Administrator and Chief Clerk - PSCSC
FROM:	Michael W. Chiasson
DATE:	January 30, 2008
RE:	Duke Market Monitoring Report, Docket # 2005-210-E

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SC PUBLIC SERVICE COMMISSION

Attached please find the Duke Market Monitoring reports for the period of October 2007 through December 2007. Let me know if you have any questions.

Regards,

Mike

Mike

Director of Operations Monitoring
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QUARTERLY MARKET MONITORING REPORT ON DUKE ENERGY CAROLINAS, LLC

October 2007 through December 2007

Issued by:

Potomac Economics, Ltd.
Independent Market Monitor

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I. OVERVIEW

This transmission monitoring report addresses the period from October 2007 through December 2007 for Duke Energy Carolinas, LLC (formerly Duke Power, a division of Duke Energy Corporation) ("Duke" or "the Company"). For the purpose of increasing confidence in the independence and transparency of the operation of the Duke transmission system, Duke proposed and FERC accepted in Docket No. ER05-1236-00 the establishment of an "Independent Entity" to perform certain OATT-related functions and a transmission monitoring plan that calls for an "independent transmission service monitor". The Midwest ISO was retained as the Independent Entity ("IE"), and Potomac Economics was retained as the independent transmission service monitor.

The scope of the independent transmission service monitor is established in the transmission monitoring plan. The plan is designed to detect any anticompetitive conduct from operation of the company's transmission system, including any transmission effects from the company's generation dispatch. It is also intended to identify any rules affecting Duke's transmission system which results in a significant increase in wholesale electricity prices or the foreclosure of competition by rival suppliers. As stated in the plan:

> The Market Monitor shall provide independent and impartial monitoring and reporting on: (1) generation dispatch of Duke Power and scheduled loadings on constrained transmission facilities; (2) details on binding transmission constraints, transmission refusals, or other relevant information; (3) operating guides and other procedures designed to relieve transmission constraints and the effectiveness of these guides or procedures in relieving constraints; (4) information concerning the volume of transactions and prices charged by Duke Power in the electricity markets affected by Duke Power before and after Duke Power implements redispatch or other congestion management actions; (5) information concerning Duke Power's calling for transmission line loading relief ("TLR"); and (6) the information provided by Duke Power used to perform the calculation of Available Transmission Capability ("ATC") and Total Transfer Capability ("TTC").

To execute the monitoring plan, Potomac Economics routinely receives data from Duke that allows us to monitor generation dispatch, transmission system congestion, and the Company's response to transmission congestion (both its operational response and its business activities). We also collect certain key data ourselves, including OASIS data and market pricing data.

The purpose of this report is to present the results of our monitoring activities and significant events on the Duke system[1] from October 2007 through December 2007.

A. Market Monitoring

Potomac Economics performs the market monitoring function on a regular basis, as well as performing periodic reviews and special investigations. Our primary market monitoring is conducted by way of regular analysis of market data relating to transmission outages, congestion, and system access. This involves data on transmission outages, transmission reservation requests, Available Transfer Capability ("ATC"), transmission line loading relief ("TLR") and curtailments or other actions taken by Duke to manage congestion. Analyses of this data aid in detecting congestion and whether market participants have full access to transmission service.

In addition to the regular monitoring of outages and reservations, we also remain alert to other significant events, such as price spikes, major generation outages, and extreme weather events that could adversely affect transmission system capability and give rise to the opportunity for anticompetitive conduct.

Our periodic review of market conditions and operations is based on data Duke provides, as well as other data that we routinely collect. Our review consists of four parts. First, we evaluate regional prices and transactions to provide an assessment of overall market conditions. Second, we summarize transmission congestion and the use of schedule curtailments in order to detect potential competitive problems. Congestion is identified by TLR events and schedule curtailments[2] on Duke's transmission system. Third, we evaluate the disposition of transmission service requests and TTC to analyze transmission

1 As allowed for in the monitoring plan, certain anomalous findings related to general market conditions, TTC and transmission outages were shared with Duke to obtain explanations prior to submission to FERC and the state commissions.

2 When we refer to schedule curtailments, we include TLR events because schedule curtailments are the main method used in the TLR procedures to manage congestion.

access and to detect whether there are circumstances on the Duke system that require closer analysis. Finally, to monitor for anticompetitive conduct, we examine periods of congestion and evaluate whether Duke operating activities raise concerns that Duke appears to be behaving anti-competitively. The operating activities that we evaluate are wholesale purchases and sales, generation dispatch and availability, and transmission availability.

In addition to our periodic reviews, we may from time-to-time be asked to or deem it necessary to undertake a special investigation in response to specific circumstances or events. No such events occurred during the time period of this report.

B. Summary of Quarterly Report

There were no notable conditions that impacted the market this quarter. As is typical for the fourth quarter, loads were low and prices were moderate.

1. Wholesale Prices and Transactions

Prices. We evaluate regional wholesale electricity prices in order to provide an overview of general market conditions. Over the course of the study period, electricity prices have been variable and exhibited a strong correlation with peak load and a relatively weak correlation with natural gas prices. This pattern is expected given the decreased reliance on natural gas fired resources during cooler fall and early winter months.

Sales and Purchases. Duke engages in wholesale purchases and sales of power on both a short-term and long-term basis. Duke was a short-term net [redacted] for the study period. Duke short-term wholesale [redacted]

2. Transmission Congestion

We use TLR events in the vicinity of Duke and schedule curtailments initiated by Duke to identify periods of congestion. Duke manages transmission congestion with generation redispatch, transmission system reconfiguration, and schedule curtailments.[3] Of these, schedule curtailments have the most direct impact on market access and outcomes. Duke operates primarily on a contract path basis. A common situation in which Duke uses curtailments is when unscheduled firm reservation rights are released to the market and scheduled for non-firm use, but are then displaced when the higher priority firm reservation holders subsequently submit schedules. The displaced non-firm schedules are curtailed. During the period of study, there were also several transmission outages that reduced TTC and led to curtailments. Curtailments can occur when the paths reach their contract limits even though they may not be heavily loaded with physical flow. During the period of study, there were 28 curtailments initiated by Duke and ten TLR events in the region.

All curtailments regardless of their basis are important because they have the same impact in reducing transmission access. Only schedules curtailed based on physical flow, however, are potentially influenced by generation operations. We analyzed the impact of Duke's generation operations on the flow-based curtailments initiated by Duke, and 10 TLR events initiated by PJM. We did not find that Duke's dispatch of generation unjustifiably contributed to flow-based curtailments or the TLR events.

3. Transmission Access

We evaluate the patterns of transmission requests and their disposition to determine whether market participants have had difficulty accessing Duke's transmission network. If requests for transmission service are frequently denied unjustifiably, this may indicate an attempt to exercise local market power. The volume of accepted requests was comparable to the previous quarter. The approval rates were also relatively high, averaging 99.5 percent over the period of study. Given the high volume of service sold and the low level of refusals, we do not find a pattern in the disposition of transmission requests that indicates restrictive access to transmission.

3 We use the term schedule loosely in this context. It is actually tags that are curtailed. Each tag represents a physical sequence and time series of schedules. Therefore, one tag may have multiple schedules comprising it. Also, sometimes the same tag is curtailed more than once.

For the period of study, we identified PJM to Duke and Southern Company to Duke as key paths on which to evaluate TTC based on refused transmission service requests and curtailed transmission schedules. There were five events when the TTC was reduced to the point that the ATC became zero. These were evaluated and found to be justified and consistent with the transmission analysis performed by the IE and the Security Coordinator.

4. Potential Anticompetitive Conduct

Wholesale Sales and Purchases. We examined the sales and purchases Duke initiated during the period of study. We focus on short-term bilateral contracts because these best represent the spot price of electricity in markets served by Duke and are the means Duke would likely use to profit by affecting wholesale electricity prices. Under a hypothesis of market power, we would expect higher sales prices or lower purchase prices during times when transmission congestion arises. Daily average transaction prices ranged between $[redacted]/MWh and $[redacted]/MWh. There were four days when sales transactions that could have potentially benefited from the congestion were executed at prices exceeding $[redacted]/MWh. We scrutinized these days when we evaluated generation and transmission operations and did not find evidence of anticompetitive conduct.

Generation Dispatch and Availability. To further evaluate competitive issues, we examine Duke's generation dispatch to determine the extent to which congestion may be caused or exacerbated by uneconomic dispatch. Congestion can result even when Duke or any utility dispatches its units in a least-cost manner. Such congestion does not raise competitive concerns. If an unjustified departure from least-cost dispatch ("out-of-merit" dispatch) occurs and causes congestion, further analysis is warranted to determine whether the Company's conduct raises competitive concerns.

Using an estimated supply curve, we analyze Duke's actual dispatch to determine whether the actual dispatch departed significantly from what we estimate to be the most economic dispatch. We then evaluate the contribution that the out-of-merit dispatch makes to flows on congested transmission paths to determine if congestion was either created and/or exploited by Duke. Our investigation into congestion events found that the potential impact of out-of-merit generation dispatch was minimal. In fact, the highest increased flow on congested paths from out-of-merit generation dispatch was only slightly over 2 MW. Thus, we conclude that the out-of-merit dispatch was not anticompetitive and did not adversely impact market outcomes.

We also conducted an analysis of potential economic and physical withholding to further evaluate generation operations. All indicators of potential economic and physical withholding were moderate and not indicative of anticompetitive conduct.

Transmission Availability. Finally, we evaluate Duke's transmission outage events in order to determine whether these events may have unduly impacted market outcomes during the study period. Some of these events affected the ability to import power from PJM. Our analysis of these events indicated that they were legitimate and we found no evidence of anticompetitive conduct.

5. Conclusions

Our analysis did not indicate any potential anticompetitive conduct from operation of the company's transmission system or generation.

C. Complaints and Special Investigations

We have not been contacted by the Commission or other entities regarding any special investigation into Duke's market behavior, nor have we detected any conduct or market conditions that would warrant a special investigation.

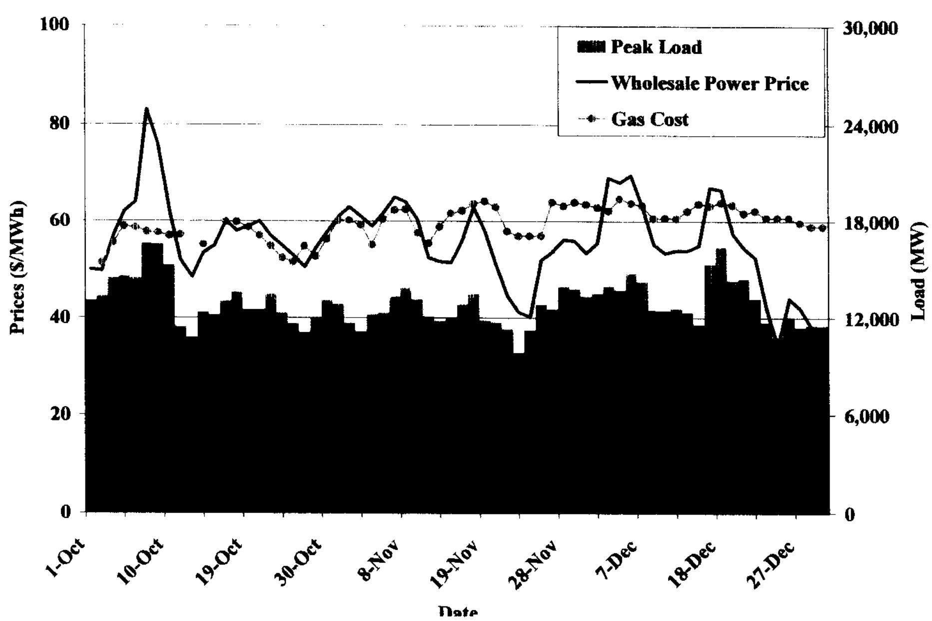
II. WHOLESALE PRICES AND TRANSACTIONS

A. Prices

We evaluate regional wholesale electricity prices in order to provide an overview of general conditions in the market in which Duke operates. Examining price movements can provide insight into specific time periods that may merit further investigation, although they are not definitive indicators of anticompetitive conduct.

Duke is not part of a centralized wholesale market in which transparent spot prices are produced. Wholesale trading in the areas in which Duke operates is conducted under bilateral contracts. Bilateral contract prices are collected and published by commercial data services such as Platts, which we use for this report. Platts publishes prices at various pricing points, including a price for the VACAR (Virginia, Carolinas) sub region of the South East Reliability Council ("SERC"), which includes Duke's control area. Figure 1 shows the bilateral contract prices for VACAR along with other market indicators.

Figure 1: Wholesale Power Prices and Peak Load October 2007 through December 2007

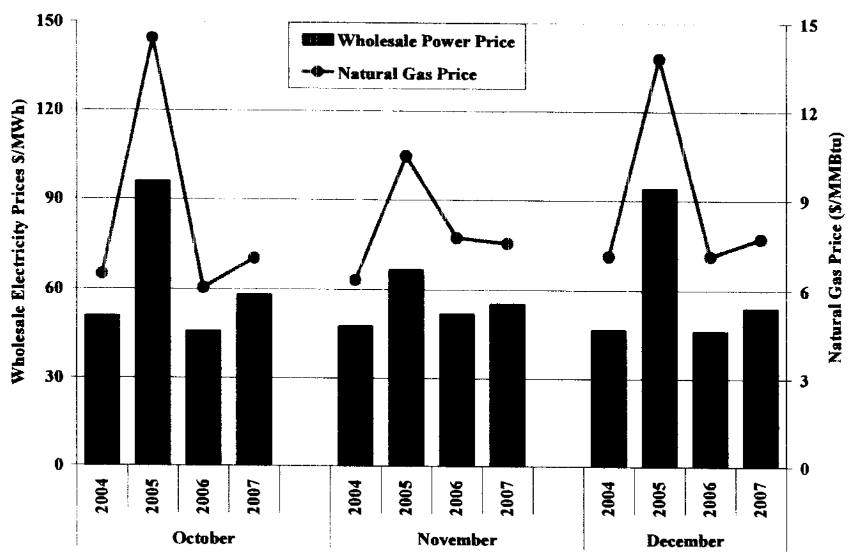


We show system load data because of its expected correlation with power prices. We show natural gas prices because natural gas-fired units are most often the marginal unit supplying the grid, and because fuel costs comprise the vast portion of a generating unit's marginal costs. We use the daily price of natural gas deliveries by Transco at its Zone 5 location, a main pricing point for gas purchases by Duke. We translate this natural gas price to a power cost assuming an 8,000 btu/kWh heat rate. This number roughly corresponds to the fuel cost portion of the operating cost of a natural gas combined cycle power plant, which should generally correspond to the competitive price for power.

Prices ranged from \$34/MWh to \$83/MWh over the study period. The correlation between power prices and load was strong (76 percent) and the correlation between power prices and natural gas prices was relatively weak (19 percent). This pattern is expected given the decreased reliance on natural gas fired resources during cooler fall and early winter months.

The next analysis compares the average VACAR power prices for each month in the study period with the corresponding month of the previous three years. Results are shown in Figure 2 together with the average of the daily Transco Zone 5 natural gas prices. As the figure shows, electricity prices have generally been correlated with natural gas prices over time.

Figure 2: Trends in Monthly Electricity and Natural Gas Prices
October 2004 – December 2007



Overall, our evaluation of wholesale electricity prices in the Duke region did not indicate a time period that merits particular attention based on pricing patterns.

B. Sales and Purchases

Duke engages in wholesale purchases and sales of power. These transactions are both firm and non-firm in nature. Figure 3 summarizes Duke's sales and purchase activity for trades that were initiated during the study period. We consider only short-term trades because we are interested in transactions that could have allowed Duke to benefit from any potential market abuse during this time period. Short-term transactions include all transactions that are done in the day-ahead or real-time markets. Longer-term transactions generally occur at predetermined prices that would not be as affected by transitory periods of congestion. Additionally, short-term transaction prices are good indicators of wholesale market conditions during periods of congestion.

Figure 3: Summary of Duke Sales and Purchases
Fourth Quarter of 2007

Redacted

As the figure shows, Duke's short-term sales [redacted] Another noteworthy feature is [redacted]. This is not uncommon for the time of year. During the quarter, Duke [redacted] we evaluate the prices during congested periods in Section V.A to detect potential anticompetitive conduct.

III. TRANSMISSION CONGESTION

A. Overview

Duke is located in the SERC region of the North American Electric Reliability Council ("NERC"). NERC is certified as the Electric Reliability Organization ("ERO") in the United States as of July 20, 2006. SERC is divided geographically into five sub-regions that are identified as Entergy, Gateway, Southern, TVA, and VACAR. VACAR is further divided into two intraregional coordination groups including VACAR North and VACAR South for the establishment of Reliability Coordinators ("RC"). Duke is within the VACAR South coordination group along with five other balancing authorities: Progress Energy Carolinas, Inc., South Carolina Electric & Gas Company, South Carolina Public Service Authority (Santee Cooper), Southeastern Power Administration, and Yadkin (a division of Alcoa Power Generation Inc).

Procedures to manage transmission congestion are implemented by the VACAR South Reliability Coordinator. The activities covered in these procedures include performing day-ahead and real-time reliability analysis, working with participants to correct System Operating Limit ("SOL") and Interconnection Reliability Operating Limit ("IROL") violations, and managing TLR events.

The VACAR South Reliability Coordinator utilizes an "Agent" to perform Reliability Coordination tasks. Duke, in addition to being a member of the VACAR South coordination group, is contracted to serve as Agent to perform the duties of Reliability Coordinator for itself and the other five VACAR South member companies. The transmission monitoring plan calls for monitoring Duke's operation of its transmission system to identify anticompetitive conduct, including conduct associated with system operations and reliability coordination.[4] Our monitoring of such conduct is limited to conduct associated with Duke's transmission system and does not extend to Duke's activities as Agent for the VACAR South Reliability Coordinator.

[4] See Transmission Service Monitoring Plan, Section 1.2.

B. Transmission Congestion

We monitor Duke for potential anticompetitive operation of generation or transmission facilities that may create transmission congestion or otherwise create barriers to rival companies' access to the markets. Congestion in the operating horizon is identified through real-time contingency analysis ("RTCA"). In this process, line-loadings are monitored to keep them within ranges whereby a system outage or "contingency" can be safely sustained. If the line-loadings exceed this safe range (called the system operating limit or "SOL"), then the lines are relieved[5] through generation redispatch, reconfiguration, schedule curtailments, and/or load reduction.[6]

Congestion between balancing authorities is monitored and managed through the use of Transmission Loading Relief (TLR) procedures. These procedures invoke schedule curtailments, system reconfiguration, generation re-dispatch, and load shedding as necessary to relieve congestion by reducing flows below the first-contingency transmission limits on all transmission facilities. Duke's general practice is to curtail schedules and re-dispatch generation as needed to manage congestion without invoking TLR procedures, but Duke can impact or be impacted by TLR events invoked by neighboring areas.

Schedule curtailments can constitute anticompetitive conduct if they are not justified. They cause an immediate reduction in market access that could affect market outcomes. Accordingly, these congestion events are the basis for our screening of Duke's generation and transmission operations.

For the purposes of our analysis, we consider two types of schedule curtailments. One we refer to as "flow-based curtailments", which are curtailments to accommodate the actual physical flows on facilities as identified by the RTCA. TLR events are included with flow-based curtailments when we conduct our analysis of operating activities. The other is "contract-path-based curtailments" which are not related to physical flows but rather to contract path limits. Contract-path-based schedule curtailments may be implemented to stay within contract limits even though the path may not be physically

5 Some contingency overloads do not require action to be taken because they do not have the potential to cause cascading outages, substantial loss of load, or major equipment damage.

6 System reconfiguration actions may include opening tie line breakers, which can cause TTC to go to zero, inducing schedule curtailments.

congested. While this has the same effect on market access, these curtailments are not caused by the operation of generation.

Contract-path based curtailments are implemented when transmission conditions reduce total transfer capability below the level of existing schedules on the contract path, which results in the curtailment of non-firm and possibly firm schedules. Contract-path based curtailments are also the result of non-firm service being displaced to accommodate a schedule under a firm reservation. Since these conditions are not affected by generation operations, we only use the flow-based curtailments in our analysis of generation operations.

During the period of study, there were 28 curtailments initiated by Duke and 10 TLR events in the region, initiated by PJM. Seventeen of the curtailments were to manage the reduced TTC on contract paths caused by transmission system outages in a neighboring system. Ten were due to service being pre-empted by higher-priority service. The remaining one curtailment was made at the request of the schedule holder because their generator that was the source for the schedule had an outage. As mentioned previously, we included the 10 nearby TLR events initiated PJM in our analysis. These congestion events will be evaluated later in this report.

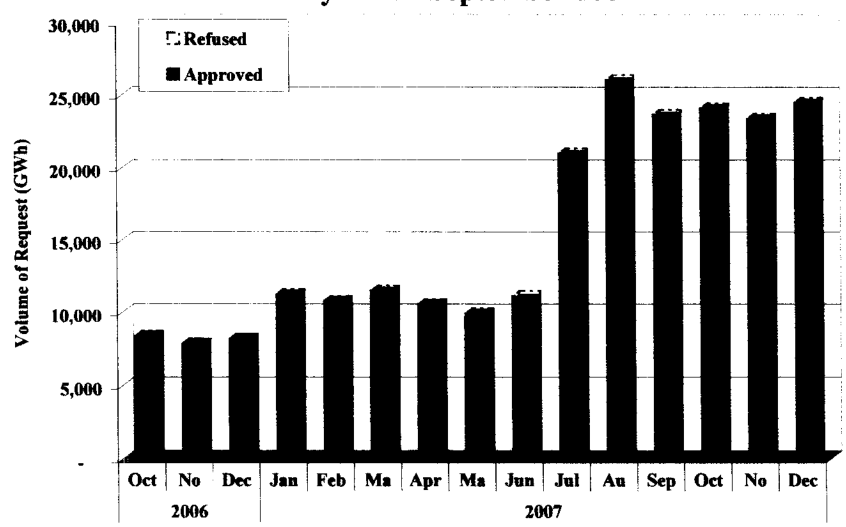
IV. TRANSMISSION ACCESS

A main component of the transmission monitoring function is to evaluate transmission availability on the Duke system. In this section, we evaluate access to transmission by analyzing the disposition of transmission requests. The patterns of transmission requests and their disposition are helpful in determining whether market participants have had difficulty accessing Duke's transmission network.

In order to make this evaluation, we calculate the volume of requested capacity that spanned the time period under study. For example, if a request was approved in January for service in June, we categorize that as an approval for June. Because requests vary in magnitude and duration, we assign a total monthly volume (GWh) associated with a request, which provides a common measure for all types of requests. Hence, a yearly request for 100 MW has rights for every hour of the month for which the request spans, just a like a monthly request. A request covering less than the entire month is assigned the hours between its stop and start date.

Figure 4 shows the breakdown of transmission service requests in each month from October 2006 through December 2007 and summarizes the disposition of the requests.

Figure 4: Disposition of Requests for Transmission Service on the Duke System July 2006 - September 2007



The figure shows that the total volumes of approved requests during the study period have increased substantially compared to the same months from the year before. This is not consistent with a hypothesis of more restrictive access.

The volume of approved and refused requests over the course of the study period was comparable to the previous quarter. Most importantly, however, the volume of approved transmission service increased substantially from the third and fourth quarters of 2006. Although it is not obvious from the figure, the refusal volume averaged only 128 GWh during the fourth quarter of 2007, down from 196 GWh during the third quarter of 2007. Additionally, the approval rate of transmission service requests was high over the study period, averaging 99.5 percent. Given that the quantities of transmission service sold have increased and approval rates have remained high, there is no evidence that Duke has restricted access to transmission capability.

To evaluate the disposition of transmission requests further, we compare the volume of transmission requests over the study period by increment of service to the requests from the corresponding period a year prior. This comparison is shown in Figure 5.

Figure 5: Disposition of Transmission by Duration of Service

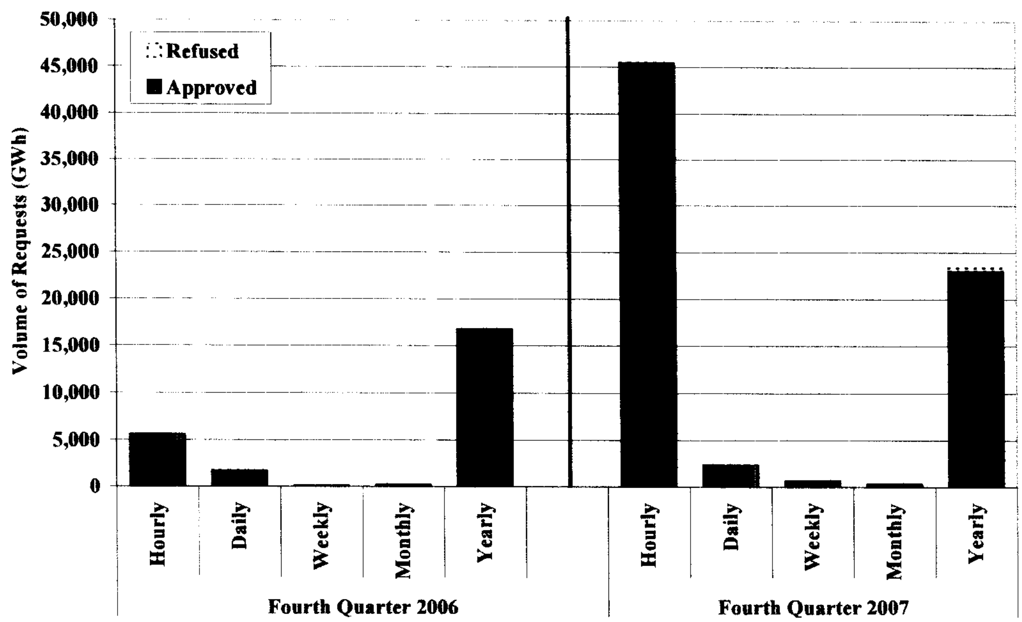


Figure 5 indicates an increase in approvals in every category of service, with the largest increases being for the yearly and hourly categories of service. The hourly category increase was unusually large because of an hourly network request made by Duke that was confirmed in July 2007 and continued through December 2007. The increases in approval volumes for every category of service further supports our conclusion that transmission access has not become more restrictive.

Next, the TTC on key paths was investigated. Based on refused transmission service requests ("TSRs") and schedule curtailments, Duke to PJM and Southern Company to Duke stood out as key paths. Of concern on these paths are events where there is a drop in TTC that is of sufficient magnitude that the non-firm ATC is reduced to zero.[7]

Our analysis is shown in Figure 6 and Figure 7. The figures show TTC, non-firm ATC and firm ATC. There were five instances when TTC dropped sufficiently to cause non-firm ATC to be reduced to zero, all of which occurred on the Duke to PJM path.

We reviewed these events and found the TTC postings were the greater of the transmission analysis performed by the IE and the Security Coordinator, and the firm transmission reservations on the path[8]. The reductions on October 25, 2007 and December 4, 2007 were associated with a line that was out of service to control buzzard contamination. The other reductions in TTC were driven by a combination of conditions. We reviewed outage data and operating logs and found the events to be justified. Thus, our review of the TTC on the key paths did not raise concerns of anticompetitive conduct.

7 The non-firm ATC is often less than the firm ATC because, since there is no hourly firm product, it is not updated throughout the day. The non-firm ATC is decremented throughout the day as reservations are made against it.

8 It is Duke's business practice to lower TTC to control flow through reducing schedules on paths forecasted to be constrained without initially affecting firm transmission rights and schedules. If the constraints arise in real-time, Duke then takes additional actions such as redispatch, reconfiguration, or issuing TLRs. It is very uncommon for Duke to issue TLRs with this approach.

Figure 6: Southern Co. to Duke Daily Minimum of Hourly Capacity

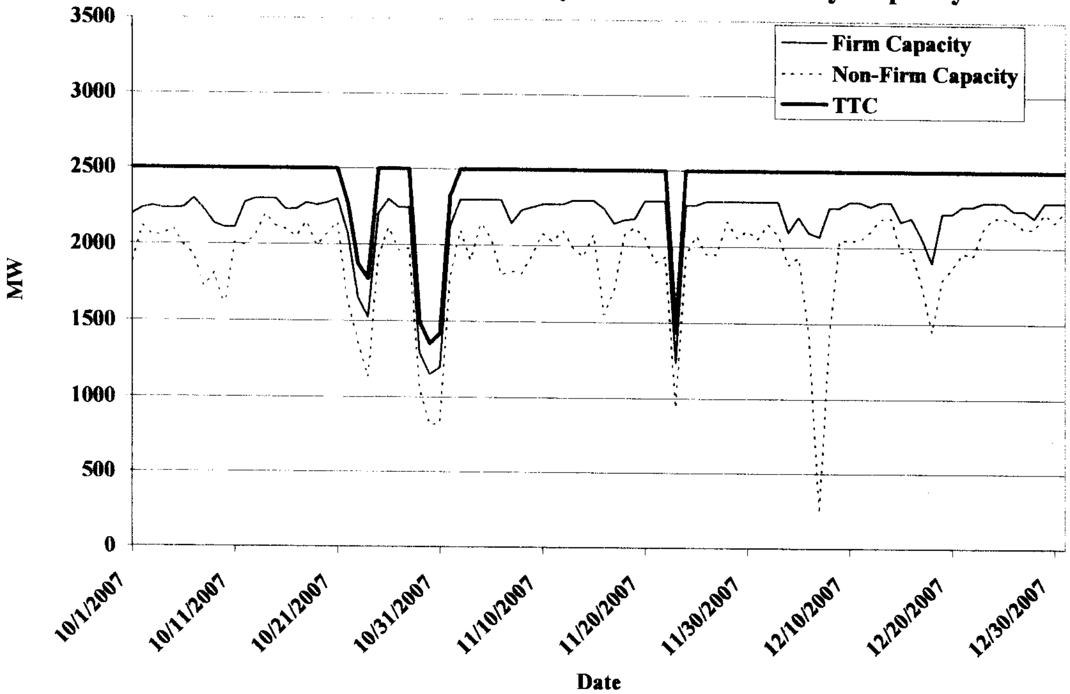
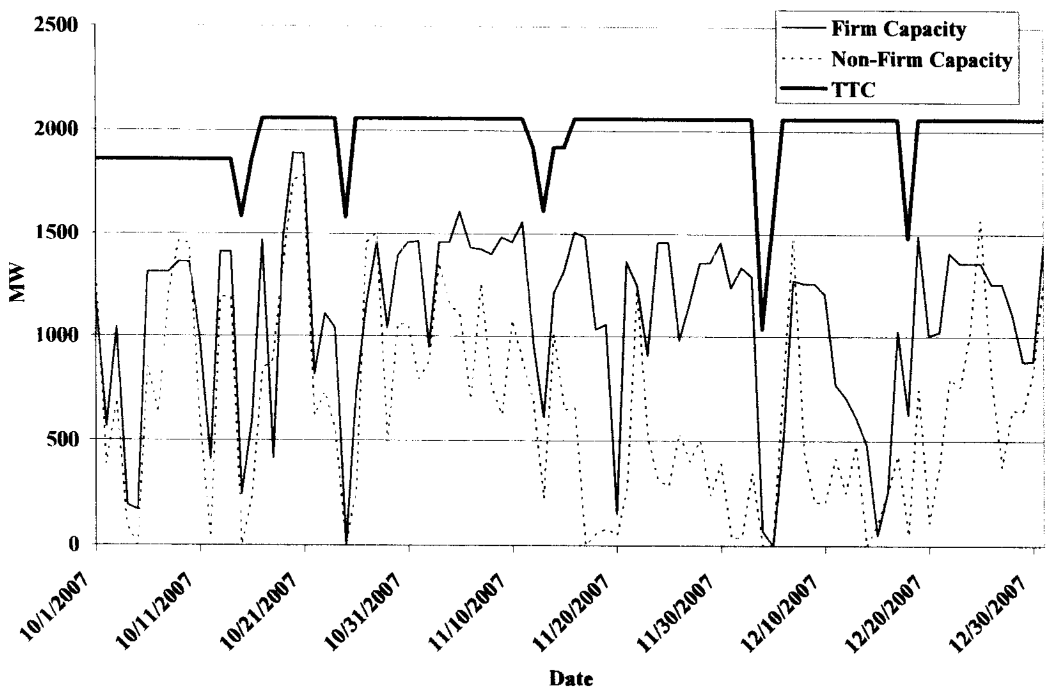


Figure 7: Duke to PJM Daily Minimum of Hourly Capacity



V. Monitoring for Anticompetitive Conduct

In this section, we report on our monitoring for anticompetitive conduct. The market monitoring plan calls for identifying anticompetitive conduct, which includes conduct associated with the operation of either Duke's transmission assets or its generation assets that can create transmission congestion or erect barriers to rival suppliers, thereby raising electricity prices. To identify potential concerns, we analyze Duke's wholesales sales in the first subsection below, its dispatch of generation assets in the second subsection, and Duke's transmission operations in the third subsection.

A. Wholesale Sales

We examine sales data to determine whether the prices at which Duke sold power may raise concerns regarding anticompetitive conduct that would warrant further investigation. We are particularly interested in periods when transmission congestion arises. If Duke were engaging in anticompetitive conduct to create the congestion, it could potentially benefit by making sales at higher prices in constrained areas or purchases at lower prices adjacent to constrained areas. We examined the short-term bilateral transactions made by Duke using Duke internal sales records. We focus on short-term transactions because anticompetitive conduct is likely to be more successful in the short-term market.

Competition is facilitated by the ability of rivals to gain market access by reserving and scheduling transmission service. Access will be limited if ATC is unavailable, transmission requests are refused, or schedules are curtailed. Curtailments are also an indicator of congestion because they can be made when a path is over scheduled or physically overloaded. If Duke's ability to curtail schedules is being abused, we would expect to see systematically higher prices for sales or lower prices for purchases coincident with curtailments.

Recall that curtailments can be flow-based (i.e., the result of flows exceeding the system operating limit), or contract-path-based (i.e., the result of contract-path reservations exceeding the path rating). For our analysis of Duke's sales, we use both types of curtailments. This is reasonable because both types of curtailments reduce market access.

Moreover, Duke has the direct ability to affect both flow-based curtailments and contract-path-based curtailments. It can affect flow-based curtailments through operating activities and it can affect contract-path-based curtailments by unjustifiable schedule reductions. By screening the curtailment data against sales activities, we can focus attention on events that merit further inquiry.

Figure 8 shows the daily average prices received by Duke for short-term bilateral sales and purchases. The figure also indicates days when curtailments occurred that could have potentially benefited Duke's position in the short-term bilateral markets. A potential benefit is determined by the electrical proximity[9] of the market delivery point to the constrained transmission path.

Figure 8: Prices for Duke Sales and Purchases
October 2007 – December 2007

Redacted

The weighted average daily prices of Duke's sales range between $[redacted]/MWh and $[redacted]/MWh. The volume-weighted average daily sales price was $[redacted]/MWh. On days

9 Electrical proximity is determined through shift factors, which are the portion of power injected at the market delivery point that flows over the constrained transmission path.

with curtailments that may have benefited Duke's net sales position, the average sales price was $[redacted]/MWh. The weighted average daily prices of Duke's purchases range between $[redacted]/MWh and $[redacted]/MWh. The volume-weighted average daily purchase price was $[redacted]/MWh. On days with potentially beneficial curtailments, the average purchase price was $[redacted]/MWh.

Given the higher average sales price coincident with potentially beneficially curtailments, we investigated further. We examined four days with potentially beneficial curtailments and weighted average sales prices exceeding $[redacted]/MWh. The days were: [redacted] The curtailments on all four of these days were associated with TLRs implemented by PJM. Duke did not initiate the TLRs, and as described later in this report, we did not find that Duke's operation of generation or transmission caused PJM to need to implement the TLRs. As such, we are satisfied that the higher sales prices were not anticompetitive conduct, but the result of prevailing market conditions in PJM.

B. Generation Dispatch and Availability

To further evaluate whether Duke's conduct raises any anticompetitive concerns, we examine the company's generation dispatch to determine the extent to which congestion may have been the result of uneconomic dispatch of generation by Duke. We conduct two analyses. We first determine the hourly quantities of out-of-merit dispatch and the degree to which the out-of-merit dispatch contributes to flows on congested transmission paths. If the contribution is significant, further investigation of these times may be warranted. We use flow-based curtailments because, as explained more below, these types of curtailments (as opposed to contract-path-based curtailments) are the ones that would result from unjustified out-of-merit dispatch. Second, we examine the "output gap", which measures the degree to which Duke's generation resources were not fully scheduled when prevailing prices exceeded the marginal cost of running the unit.

1. Out-of-Merit Dispatch and Curtailments

Congestion can be a result of limits on the transmission network when utilities dispatch their units in a least-cost manner. This kind of congestion does not raise competitive concerns. If a departure from least-cost dispatch ("out-of-merit" dispatch) is unjustifiable and causes congestion, it raises potential competitive concerns.

We pursue this question by measuring the out-of-merit dispatch on the Duke system. In our analysis, we consider a unit to be out-of-merit when it is dispatched when a lower-cost unit is not fully loaded at the same time. To identify out-of-merit dispatch, we first estimate Duke's marginal cost curve or "supply curve".[10] We use incremental heat rate curves, fuel cost, and other variable operations and maintenance cost data provided by Duke to estimate marginal costs. This allows us to calculate marginal costs for Duke's units. We order the marginal cost segments for each of the units from lowest cost to highest cost to represent the cost of meeting various levels of demand in a least-cost manner. For our analysis, the curve is re-calculated daily to account for fuel price changes, planned maintenance outages, and planned deratings.

Figure 9 shows the estimated supply curve for a representative day during the time period studied.

Figure 9: Duke Supply Curve

Redacted

Note: Excluding Approximately 11,900 MW of Nuclear and Hydro Capacity.

10 We use the term marginal cost loosely in this context. The value we calculate is actually the *marginal running cost* and does not include opportunity costs, which may include factors such as outage risks or lost sales in other markets.

The dispatch analysis excludes nuclear and hydro units since their operation is not primarily driven by current system marginal operating costs. Nuclear resources rarely change output levels and the opportunity costs associated with hydroelectric resources make it difficult to accurately estimate their costs.

As the figure shows, the marginal cost of supply increases as more units are required to meet demand, as expected. The highest marginal cost is over $[redacted]/MWh. We use each day's estimated marginal cost curve as the basis for estimating Duke's least-cost dispatch for each hour in the study period.

In general, this will not be completely accurate because we do not consider all operating constraints that may require Duke to depart from our estimate of least-cost dispatch. In particular, this analysis does not model generator commitments, assuming instead that all available generators are online. While market monitoring resources could have been expended to refining the estimated generator commitment and dispatch to make it correspond more closely to actual operating parameters (i.e., start costs, run-time and down-time constraints, etc.), we believe this simplified incremental-operating-cost approach is adequate to detect instances of significant out-of-merit dispatch that would have a material effect on the market.

When a unit with relatively-low running costs is justifiably not committed, our least-cost dispatch will overstate the out-of-merit quantities because it will identify the more expensive unit being dispatched in its place as out-of-merit. This may result in higher levels of out-of-merit dispatch during low-load periods when it is not economic to commit certain units.

Other justifiable operating factors that cause the out-of-merit dispatch to be overstated are energy limitations and ancillary services. An example of an energy limitation is a coal delivery problem that prevents a coal plant from being fully utilized. Because the coal plant is still capable of operating at full load for a shorter time period, the condition does not result in a planned outage or derating. The necessity to operate the plant at reduced load to conserve coal can cause the out-of-merit values to be overstated.

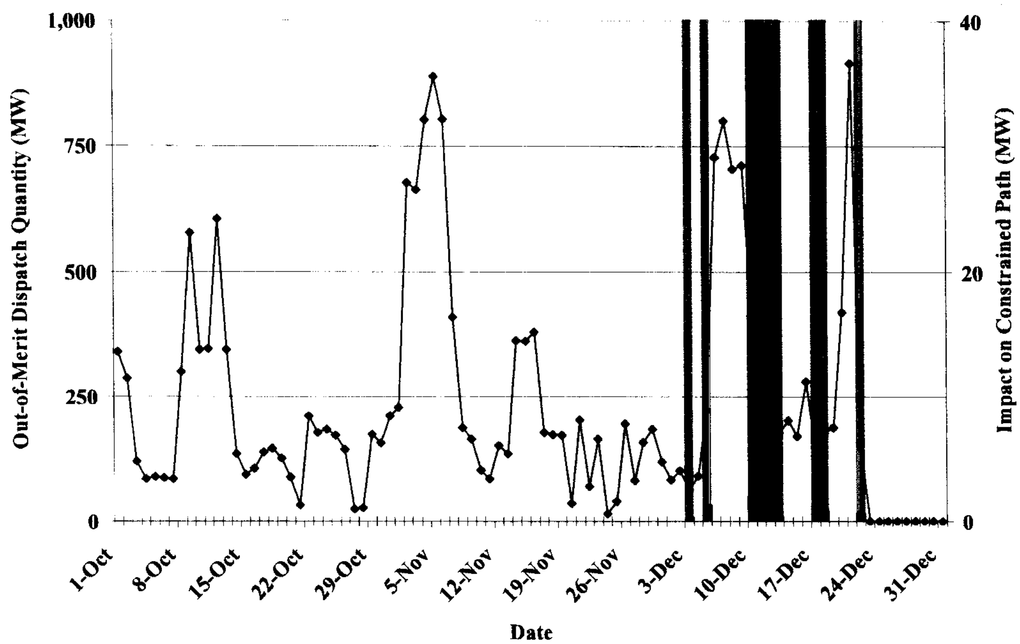
Ancillary services requirements such as spinning reserves, system ramp rate limitations, and AGC control requirements can make it operationally necessary to dispatch a number of units at part load rather than having the least expensive unit fully-loaded. These operational requirements can cause the out-of-merit values to be overstated. The out-of-merit quantities include units on unplanned outage since a sudden unplanned outage may be an attempt to uneconomically withhold generation from the market.

Overall, our analysis will tend to overstate the quantity of generation that is truly out-of-merit. Accordingly, the accuracy of a single instance of out-of-merit dispatch is not as important as the trend or any substantial departures from the typical levels.

In our analysis, we seek to identify days with significant out-of-merit dispatch that coincides with transmission congestion. Congestion is indicated by flow-based schedule curtailments. Flow-based curtailments are those that are taken close to real-time in order to prevent physical flows from exceeding system operating limits. Out-of-merit dispatch can be used to affect these flows and create the need for curtailments; potentially limiting competition in specific locations. Contract-path based curtailments, on the other hand, are the result of reserved rights on the contract paths and are unaffected by real-time dispatch.

Figure 10 shows the daily maximum "out-of-merit" dispatch for the peak hours of each day in the study period. Also shown in the figure are days with flow-based curtailments represented as blue bars. For these days, the out-of-merit dispatch displayed is the maximum taken over just the hours of the day with curtailments. The red bars show the maximum impact of the out-of-merit dispatch on the congested path(s) for that hour.

Figure 10: Out-of-Merit Dispatch and Congestion Events
October 2007 – December 2007



As the figure shows, there were no days when out-of-merit dispatch contributed at least five MW of increased flow over congested paths during the study period. In fact, the highest increased flow was only slightly over 2 MW. As such, we found that there were no significant effects on transmission constraints due to out-of-merit dispatch. Consequently, we do not find evidence of anticompetitive conduct.

2. Output Gap

The output gap is another metric we use to evaluate Duke's generation dispatch. The output gap is the output of an available generation resource that is unloaded when the prevailing market price exceeds the marginal cost of producing from that unit by a specified threshold or more. We use \$25/MWh and \$50/MWh as two thresholds in our analysis. Hence, at the \$25/MWh threshold, if the prevailing market price is \$60/MWh and a unit with marginal costs of \$40/MWh is unloaded, then we do not consider this part of the output gap. However if the marginal cost is \$30/MWh, we would consider it in the output gap at the \$25/MWh threshold, but not under the \$50/MWh threshold.

Figure 11 below shows the minimum daily output gap for the peak hours (hour ending 7 AM through hour ending 10 PM). The minimum is shown because the most liquid market is for a 16 hour block, and enough units must be committed to meet the peak hour of demand. As a result, it is necessary to keep some of the required units at part load during the hours with lower demand, resulting in an increase in the output gap. Only units that are committed during the day are included in the daily calculation. Hydro and nuclear units are also excluded.

For this analysis, we used a composite price derived by taking the minimum of the Platts published VACAR price (introduced above) and PJM real-time prices at the AEP hub as the market price. We chose the composite price to ensure that if a portion of a unit's capacity were included in the output gap both day-ahead and real-time prices were taken into consideration. Theoretically, dispatch should be driven by real-time prices, but the timing of gas nominations and the limited liquidity in the real-time markets cause the day-ahead market to also be important for dispatch. The minimum daily output gap is used in the analysis, because this represents the quantity of power that could have been sold profitably on a 16 hour on-peak block schedule without having to commit additional units.

Figure 11: Minimum Daily Output Gap
October 2007 – December 2007

Redacted

The figure shows that the output gap occurred on two days at the $50/MWh threshold. Using the $25/MWhr threshold, the output gap occurred on 55 days. However, the most prominent feature is the spike in the output gap that occurred on December 14th. Investigating further, we found that 130 of the 150 MW was accounted for by the [redacted] unit being at part load. We inquired further and found [redacted] was at part load because it was ramping up in its return from a forced outage. The remaining values were small relative to the large number of generators on the Duke system. These results do not indicate evidence of anticompetitive conduct through the withholding of generation.

3. Generator Availability

We evaluate generator availability by examining the amount of capacity on outage as well as the ratio of capacity on outage to total capacity. In our first analysis, in Figure 12 we compare the average capacity on outage as well as the VACAR price and the prices of Duke short-term sales.

Figure 12: Outage Quantities
October 2007 – December 2007

Redacted

The figure shows that Duke sales prices and the market (VACAR) price are correlated, with a few exceptions. Some differences are expected because the Duke sales prices include day-ahead and real-time transactions while the wholesale prices reflect only day-ahead transactions. Planned outages generally increased through mid November and then declined as expected temperatures decline. The correlation between unplanned outages and prices is not immediately apparent from the chart. Therefore, we present this statistic below in Figure 14.

Figure 13 shows the average ratio of capacity in outage to total capacity (i.e. the average outage rate) and the VACAR price and the Duke short-term sales price. This chart reveals patterns similar to that revealed in Figure 12. The average forced outage rate over the study period was approximately [redacted] percent, which is low by industry standards.

Figure 13: Outage Rate October 2007 – December 2007

Redacted

Finally, the correlations of the average outage rates to the VACAR price and the short-term sales price are shown in Figure 14.

Figure 14: Correlation of Average Outage Rates with Wholesale Energy Prices October 2007 – December 2007

	Correlation with VACAR Index	Correlation with Duke Short Term Sales Prices
Scheduled Outages	36%	11%
Unscheduled Outages	9%	0%

While the figure reports both scheduled and unscheduled outages, the unscheduled ones are the most important from a market power perspective. Planned outages are expected and generally are scheduled in off-peak periods. Unscheduled outages can occur during peak times.

The positive correlations of the scheduled outage rate with VACAR index prices and short term sales prices are anomalous given that planned outages are typically scheduled during off-peak periods when prices are lower. However, during this time of year, outages are long enough to span both on and off-peak periods. There was also a positive correlation of the unscheduled outage rate with VACAR index prices, but this number was too small to indicate a pattern of physical withholding affecting market prices. Thus, we do not conclude that generation outages were associated with anticompetitive conduct.

C. Analysis of Transmission Availability

Transmission outages are reviewed in order to determine whether they limit market access and, if so, whether they are justified. There were over 200 transmission outages that affected power flows on elements at 100 kV and higher during the period of study. We focused on elements that impacted the ability to import power from PJM because that was the most congested path during the period of study. The events associated with trench bushings on transformers that were identified last quarter continued this quarter. The North Greensboro substation had a tie line out for [redacted] for trench bushing replacement. The initial failure led to concerns of similar components failing at other locations. Thus, outages continued to be taken to inspect and test other transformers. We find these to be justifiable outages.

There was an outage of the Newport to Richmond 500 kV line on [redacted]. This restricted flows from SOCO to PJM through Progress Energy, causing high loop flows through the Duke to PJM interface. We investigated this and found it to be caused by buzzard contamination. The line was taken out, again affecting the Duke to PJM interface, on [redacted] by Progress Energy to install buzzard shields. We find these to be justified outages.

A continuing event from the last three quarters is the outage of the Nantahala to Robbinsville line. The line returned to service on [redacted]. This outage affects the Duke to TVA interface. Two TSR refusals coincided with the outage. There were no schedule curtailments related to the outage. We did not find it necessary to further evaluate this outage because it was planned well in advance and, therefore, is unlikely to be the result of an attempt to exploit short term market conditions.